Patent Claims

1. Method for determining the remaining operational life of elastic cables that are composed of individual filaments and serve for mooring a vessel to a pertaining buoy, including

- plotting a fatigue curve for the filaments of the cable via dynamic tests,
- producing a test cable from the material of the cable, wherein the test cable is comprised of a number of sections that are detachably connected to one another,
- determining the minimum breaking load of the sections of the test cable,
- mooring the vessel to the pertaining buoy via one of the elastic cables accompanied by the interposition of a load-carrying system,
- placing the test cable adjacent to the elastic cable,
- removing sections from the test cable at prescribed time intervals,
- determining the minimum breaking load for each removed section of the test cable and forming a first coefficient A with reference to the original minimum breaking load, wherein the

first coefficient represents the loss of carrying strength as a consequence of environmental influences,

- from the coefficients A determined for all of the sections of the test cable, plotting an environment-dependent curve against time,

- associating with each first coefficient A a second coefficient B that, for the point in time of the removal of the pertaining section of the test cable, is determined from the fatigue curve on the basis of the load spectrum (load frequency and strength over time) supplied by the load-monitoring system, wherein the second coefficient represents the loss of carrying strength as a consequence of the load influences,

- multiplying the pair of coefficients A and B together to form reduction factors,

- at the conclusion of the test phase, dismantling the elastic cable, determining its remaining strength, and comparing it with the original minimum breaking load to form an actual reduction factor, thus enabling a comparison with the reduction factor determined at the same point in time via the test cable;

- forming the actual reduction factors of a future cable from the coefficient B, which is determined from the fatigue curve and the

actual load spectrum, as well as from the coefficient A, which is read from the environment-dependent curve,

- estimating the remaining operational life of a future cable from the actual reduction factors thereof, including a safety factor.

2. Method according to claim 1, characterized in that the reduction factors of the test cable sections are plotted as a remaining strength curve against time.

3. Method according to claim 2, characterized in that the remaining strength curve is extrapolated beyond the test phase.

4. Method according to one of the claims 1 to 3, characterized in that a test cable is used having a diameter that is less than that of the elastic cable.

5. Method according to one of the claims 1 to 4, characterized in that the test cable is connected with the elastic cable in a friction-free manner.

6. Method according to one of the claims 1 to 5, characterized in that the test cable sections are removed in time intervals of three months.

7. Method according to one of the claims 1 to 6, characterized in that the determination of the minimum breaking load of the removed test cable sections is carried out by tests on the removed sections themselves or by individual filament tests on the filaments thereof, as a function of a comparison between the results of preliminary tests and the manufacturer specifications.

8. Method according to one of the claims 1 to 6, characterized in that the dynamic tests for plotting the fatigue curve are carried out on individual filaments.

9. Method according to one of the claims 1 to 8, characterized in that the fatigue curve is established similar to a Wöhler curve.

10. Method according to one of the claims 1 to 9, characterized in that the coefficients B are determined by using the "Palgren-Miner-Hypothesis".

11. Method according to one of the claims 1 to 10, characterized in that a test cable is used that has a length that does not fall below the minimum length of the wave lengths that are predominantly to be expected at the location.

12. Method according to one of the claims 11, characterized in that the test cable is connected with the pertaining buoy via an extension section.

13. Method according to one of the claims 1 to 12, characterized in that,

- loops are spliced onto the ends of the test cable sections,
- the loops of adjacent sections are superimposed, and
- the cords of the superimposed loops are wrapped around.